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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/574,955	05/19/2000	Michael J. Renn	881.008US2	9915

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EXAMINER

SONG, SARAH U

ART UNIT PAPER NUMBER

2874

DATE MAILED: 12/05/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/574,955

Applicant(s)

RENN ET AL.

Examiner

Sarah Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Priority

1. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

An application in which the benefits of an earlier application are desired must be copending with the prior application or with an application similarly entitled to the benefit of the filing date of the prior application.

Drawings

2. This application has been filed with informal drawings, which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

Specification

3. The abstract of the disclosure is objected to because it exceeds the current 150-word limit. Correction is required. See MPEP § 608.01(b).
4. The disclosure is objected to because of the following informalities: On page 9, in lines 25-28, the Examiner believes that the figures referenced are intended to be FIGS. 7(a)-(d), etc.

Appropriate correction is required.

Claim Objections

5. Claim 16 is objected to because of the following informalities: Examiner suggests "The method", first occurrence, to be changed to "A method".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 13, 14, 26 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Regarding claims 13 and 14, Claim 13 provides for the use of the steps of claim 8 to deposit a plurality of particles onto the substrate, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced. Claim 13 is also indefinite for incorporating dependence of independent claim 11, and claim 8, which is dependent upon independent claim 1; the dependency of the claim is unclear. For purposes of examination, claim 13 will be interpreted as, "The method of Claim 11, further comprising depositing a plurality of particles onto the substrate". Claim 14 inherits the same indefiniteness.

Claims 13 and 14 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

9. Regarding claim 26, as depending from claim 20, "the solid portion" is not previously recited. It is unclear whether or not claim 26 is intended to depend from claim 25. Claim 26 will be examined as depending from claim 25 to provide sufficient antecedent basis for "the solid portion".

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10. Regarding claim 27, there appears to be lacking a recitation for "directing a first laser beam into the channel" to precede "through a first opening of the optical conductor;". For purposes of examination, the claim will be examined with the inclusion of the above recitation.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1, 2, 4-10, 20, 21, 24-26, 33, 34 and 36-42 are rejected under 35 U.S.C. 102(b) as being anticipated by Lewandowski et al. (cited by the applicant). Lewandowski et al. discloses non-atomic (micron sized > 10 nm) particles being guided through a hollow optical fiber by a laser, which confines the particles. A source of the particles is provided before confining the particles inside the beam (inherent). The particles are guided down the hollow portion of the fiber in air or in aqueous solutions. Applications include transfer of a particle (one material) or separation of particles (more than one material), and deposition onto a surface (substrate). Separation of particles also implies some sort of treatment during the transport to result in the separation of the particles in solution. It is noted that the laser beam would also inherently impart a degree of thermal treatment to the particles. It is also noted that hollow optical fibers typically comprise a first opening, upon which an optical beam is incident, and a second opening, through which an optical beam exits, wherein the first and second openings are located at two opposite ends of the optical fiber. It is additionally noted that any substrate surface inherently comprises a plurality of locations onto which the particles can be deposited.

13. Claims 1-26 and 33-42 are also rejected under 35 U.S.C. 102(b) as being anticipated by Renn et al. (*Particle Manipulation and Surface Patterning by Laser Guidance*, cited by the applicant). Regarding claims 1-15, Renn et al. discloses a method of confining a particle inside a laser beam, the particle having a dimension (50 nm to 9 μ m) larger than a wavelength of the laser beam (800 nm); directing the laser beam into a through channel, along the longitudinal axis, of an optical conductor or a hollow fiber; transporting the particle through the channel by causing the laser beam to propagate along the channel; and causing the laser beam to exit the through channel and deposit the particle onto a predetermined spot on the substrate. The hollow portion of the fiber is filled with a gas or a liquid. A source generating the particle is inherent. See Abstract. The method also comprises an optical system for focusing the laser beam before confining the particles inside the beam (Figure 1). The particles are solid (abstract), and the particles may also be made of one material, or two or more materials (e.g. water-salt droplets, liquid). Renn et al. also discloses multiple particles (crystallites) being deposited onto different spots of the substrate, wherein the substrate was translated with a micromanipulator (page 9, 2nd paragraph).

14. Regarding claims 16-19, Renn et al. additionally discloses providing a solution containing the material and transforming at least a portion of the solution into a plurality of non-atomic droplets, confining the droplets inside the laser beam, transporting the droplets, and depositing the droplets onto the substrate (page 9). It is noted that glass is an insulator and NaCl is a dielectric. The minimum particle (droplet) size guided by Renn et al. is 50 nm > 10 nm.

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15. Regarding claims 20-26, due to the laser confinement of the particles in solution, the treating of the particles while transporting them inside the through channel inherently comprises thermal treatment, resulting in crystallization of the solid portion and deposition of the solid portion onto the substrate.

16. Regarding claims 33-42, the corresponding apparatus is also disclosed in Figure 1.

17. Claims 27, 28 and 30-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Renn et al. (*Laser Guidance and Trapping of Mesoscale Particles in Hollow-Core Optical Fibers*, cited by the applicant). Renn et al. discloses a trap using counterpropagating laser beams coupled into opposite ends of a horizontal fiber. It is noted that optical fibers typically comprise first and second openings, which are disposed opposite to each other. Renn et al. also discloses a single beam trap formed by balancing the gravitational and axial forces in a vertically oriented fiber. It is noted that a laser beam directed into a first opening of the fiber will exit through a second opening.

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Renn et al. (*Laser Guidance and Trapping of Mesoscale Particles in Hollow-Core Optical Fibers*, cited by the applicant). Renn et al., discussed above, does not specifically disclose the step of changing an

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intensity of one or both of the laser beams to change a position of the confined particle.

However, it would have been obvious to one of ordinary skill in the art to disturb the force equilibrium in the axial direction to change a position of the particle to eventually remove the particle from the channel. It would have also been known to one of ordinary skill that the force generated by the laser beams would be dependent on the intensity of the laser beam. Therefore, it would have been obvious to one of ordinary skill in the art to change an intensity of one or both laser beams to change a position of the confined particle.

20. Claims 11-19, 22, 23, ~~3~~ and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewandowski et al. as applied to claims 1, 20 or 33, as applicable above.

21. Regarding claims 3 and 35, Lewandowski et al., discussed above, does not specifically teach an optical system for focusing the laser beam. However, a focusing arrangement would have been obvious to one of ordinary skill in the art to increase coupling efficiency into the hollow core fiber.

22. Regarding claims 11-15, Lewandowski et al. does not specifically disclose the particle to have a dimension larger than a wavelength of the laser beam. However, the laser beam would typically have a wavelength on the order of several hundred nanometers. The particle is disclosed as having a dimension of several micrometers. Therefore, a particle having a dimension larger than a wavelength of the laser beam would have been obvious to one of ordinary skill in the art, since several micrometers is larger than several hundred nanometers.

23. Regarding claims 16, 18, 19, 22 and 23, Lewandowski et al., discussed above, discloses particles in solution and aqueous solutions, but does not specifically disclose transforming at

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least a portion of the solution into a plurality of non-atomic droplets near a first opening. It would have been within the level of ordinary skill in the art to transform at least a portion of the solution into a plurality of non-atomic droplets to effect proper laser guiding of the microscopic droplets in solution, as opposed to a bulk solution. It is noted that polystyrene is a polymer.

24. Regarding claim 17, Lewandowski et al., discussed above, does not specifically disclose a substrate material. However, it would have been within the level of ordinary skill in the art to select viable substrate materials for the particular application.

Conclusion

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 6,251,488 B1 to Miller et al. discloses precision spray process with laser treatment for producing direct write electronic components utilizing a hollow fiber to direct the particles. U.S. Patent 6,151,435 to Pilloff discloses a metal-coated hollow optical fiber for evanescent atom guiding.

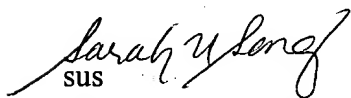
26. The prior art documents submitted by the applicant in the Information Disclosure Statement filed on November, 2, 2000 have all been considered and made of record (note the attached copy of form PTO-1449).

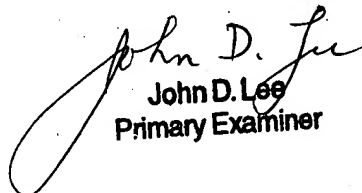
27. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c), and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

28. Any inquiry concerning the merits of this communication should be directed to Examiner Sarah Song at telephone number 703-306-5799. Any inquiry of a general or clerical nature, or relating to the status of this application or proceeding should be directed to the receptionist at telephone number 703-308-0956 or to the technical support staff supervisor at telephone number 703-308-3072.


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November 27, 2001


John D. Lee
Primary Examiner